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Physiotherapeutic procedures used in patients after surgical treatment of maxillofacial and occlusal disorders

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Abstract

The treatment of patients with craniofacial defects is interdisciplinary and long term. In order to restore the function of the stomatognathic system (chewing, swallowing, speech, breathing) and to improve the aesthetic appearance of the face, patients with malformations and acquired defects require combination therapy. It is necessary to cooperate with a surgeon, orthodontist, phoniatrist, speech therapist, prosthetist, psychologist and physiotherapist. The earlier treatment of facial cranial defects is started, the better final results can be obtained. The aims of rehabilitation are: prevention of pulmonary complications, prevention of deep vein thrombosis, restoration of the efficiency of the stomatognathic system, removal of functional and organic consequences of surgery. The implementation of these goals begins on the first day after surgery and continues until the patient is discharged from the hospital. The next step is ambulatory rehabilitation.

Key words: physiotherapy, craniofacial defects, postoperative treatment.

The physiological development of the facial part of the skull is a complex process. Often, pathological factors overlap and it is difficult to grasp which of them were primary and which were secondary. When considering the causes of pathologies in the face, jaw and teeth, one should take into account: the child's development period, time, strength and mode of action of the damaging factor, the tissue on which this cause works, and the body's response to destructive factors (1). A division of the etiological factors causing facial cranial disorders was adopted. These are intrinsic and extrinsic factors affecting the embryo or fetus and extrinsic factors affecting in non-fetal life (1).

The main centers of facial and cranial growth are free bone margins, sutures, cartilage and condylar condyle (2). In addition, the adjacent soft tissues affect the growth of facial bones. The main directions of face development are downward and forward (2). Both the jaw and mandible increase through the processes of resorption and bone deposition. The direction and size of growth are determined by the individual genetic growth pattern. Changes in this pattern or in the speed of development may lead to incorrect morphology of the facial bones and associated occlusal disorders (3).

Genetic and environmental factors have an important role in the formation of facial, maxillofacial and occlusal disorders. Genetically predisposed to certain malformations or diseases may result from chromosomal anomalies and mutations with high gene expression, e.g. in Down syndrome or Patau syndrome. In the first two months of pregnancy, the embryo is especially sensitive to harmful external factors. Denis Brown shared the factors that had an adverse effect during the intra-uterine life on: improper placement of the fetus in the womb, increased mechanical pressure due to the abnormal structure of the reproductive organs of the mother, tumors of the uterine walls, pressure of the fetal shoulder or limbs on the face and external injuries to which the pregnant woman was exposed (1, 4). In the postpartum period, external factors are the most common cause of both morphological and functional abnormalities within the craniofacial area. The causes of acquired defects can be divided into: dysfunctions (impaired physiological functions), and parafunctions (stereotypical activities) (5).

Surgery of the facial, maxillofacial and occlusal disorders is a branch of medicine covering patients with all defects within the skull and face from birth to adulthood. Surgeons work with cleft lip jaw and mandible defects, skull growth disorders such as craniostenosis (3,6). Developmental defects of the face and oral cavity, as well as deformation of the jaws causing impairment of the function of the stomatognathic system, e.g. chewing, speech, swallowing, breathing, require not only surgical treatment, but also orthodontic and prosthetic treatment for full rehabilitation.

Nowadays, the treatment of patients with occlusal defects is based on the team activity of many specialists. The results of treatment for the patient and the doctor can be fully satisfactory only if the patient is under the constant care of an integrated team of doctors and therapists at all stages of treatment. In the treatment program of patients with craniofacial defects, we can indicate the pre-operative period (assessment of, among others: maxillofacial surgeon, genetics, pediatricians, periodontal, conservative, orthodontic preparation), surgical procedures and the postoperative period (termination of orthodontic, conservative, prosthetic and periodontology; physiotherapy, speech therapy, psychotherapy) (3).

In addition to surgery and dentistry, comprehensive treatment of facial cranial defects should include physiotherapy, which includes activities that have a positive effect on the patient's mental and physical condition. Postoperative physiotherapy is an essential element of every surgery. It is very important to choose the right therapy to improve the functioning of the stomatognathic system, gradually strengthen muscle structures, minimize swelling, restore proper biomechanics in the temporomandibular joints. The main goals of physiotherapy in patients after craniofacial treatment are: shortening the recovery period after surgery, assessment of the patient's functional state, assessment of stomatognathic system disorders, i.e.: chewing, swallowing, breathing, articulation, selection of appropriate forms, means, methods and techniques of exercise depending on the patient's functional state, developing a program of local and general exercises to achieve the closer and further purpose of physiotherapy, introducing objective methods to control the patient's functional state, general strengthening of the body and its individual organs and systems.

There are two parts in the physiotherapeutic program: diagnostic and therapeutic. Functional diagnostics (depending on the patient's age and type of surgery) in patients after craniofacial surgery are based on the assessment of: head position, cervical spine mobility, examination of temporomandibular joint mobility (abduction, protrusion, laterotrusion), evaluation of the mandibula movement, assessment soft tissue tension and tenderness, two-plate zone assessment, Boumann orthopedic temporomandibular joint assessment, hyoid bone alignment and tongue mobility assessment, function assessment i.e. chewing, swallowing, speech, breathing. The physiotherapeutic procedures performed in patients after surgery for craniofacial defects include (7,8):

1. Mobilization of soft tissues of the head and cervical spine - differentiation tests show limited mobility due to strained or shortened periarticular soft tissues (and not through the contracted articular capsule), depending on the needs, they are mobilized using:
 - a) Functional massage - this is a massage of the muscle and other soft tissues nearby connected to the movement of the joint. It is used for both muscle and joint dysfunction. During this treatment, the muscle with surrounding tissues is rubbed and stretched. This massage reduces soft tissue tenderness and improves their mobility.
 - b) Transverse massage - it is a point grinding across the fibers of an irritated tendon or muscle, a tendon attachment to the bone, ligament, etc.
 - c) Post Isometric Relaxation (PIR) - it is active relaxation of irritated muscles after maintaining them in isometric tension. Respiratory, head and eye movements can be used for relaxation.
2. Mobilization of the temporomandibular joint - displacement of the joint surfaces - glide, without exceeding the physiological range of motion.
3. Neuromobilizations - mobilizations to restore proper nerve mobility. This procedure aims to normalize the excitability and intensity of nerve processes. This allows for more complete information transfer in the body and improvement of repair processes. It often allows for an almost immediate improvement of function and elimination of soreness and for faster regeneration of irritated tissues in those situations where the reason for the pathology is a dysfunction.
4. Active (autotherapy) and active-passive exercises in the temporomandibular joint, suprahyoid structures, cervical spine, tongue, hyoid bone, e.g. Gery's Exercise.
5. Breathing exercises that may have the following nature: preventive (preventing respiratory disorders resulting from limitation of motor activity and other risk factors for pulmonary postoperative complications), therapeutic (treatment of complications or removal or compensation

of respiratory disorders), relaxing and sedative (used during other therapeutic exercises). Breathing exercises are carried out in appropriate positions. Depending on the needs, additional drainage positions are used.

6. Manual dysphagia therapy (MTD) - the goal of therapy is to affect postural control and dynamic stabilization of posture during swallowing and breathing, so that respiratory-swallowing cycles can be effectively and safely coordinated. Both non-contractile (nerve structures) and contractile (muscle) elements are mobilized.

7. Manual treatment of postoperative scars - the therapy begins with the indirect release of the tissues surrounding the scar (after 3-4 weeks after the procedure), using the technique of static and dynamic rolling as well as longitudinal and oblique tissue extension around the scar. Soft tissue therapies associated with scars begin after the wound has completely healed (about 6-9 weeks after surgery).

8. Lymphatic drainage (manual) - effects on postoperative edema in the face and neck.

9. Kinesiotaping (dynamic taping) - the use of special tapes in the head and neck area provides analgesic, anti-swelling and stabilizing effects.

10. Whole body exercises - affect the whole body by improving the range of motion in the joints of the musculoskeletal system and the functioning of the circulatory and respiratory system.

The most important rule before physiotherapy in patients after craniofacial surgery is to obtain the doctor's consent. In the absence of contraindications, therapy should be started as soon as possible and it should end when the patient returns to full fitness (9).

Physiotherapy in maxillofacial surgery should be integrated with the entire therapeutic process, which will significantly reduce the incidence of complications in patients and reduce the cost of their treatment. Rehabilitation after surgery is aimed at preventing the negative effects of the procedure, such as: pain, swelling, limiting the mobility of the temporomandibular joints, weakening of muscle strength and muscular atrophy, scars. Physiotherapy should be carried out systematically by a qualified physiotherapist in cooperation with the patient's doctors and family.

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